21st-Century Keytars

Written By: Owen Grace

⚙ **PARTS:**

- [Computer running Windows XP, Vista, or Mac OS X (1)](#)
- [Internal or external sound card (1)](#)
- [Guitar Hero controllers (1-2)](#)
- [Fretbuzz software (1)](#)

SUMMARY

It's all fun and games until someone turns those plastic Guitar Hero axes into real instruments. What musical possibilities lie hidden beneath those 5 rainbow-colored buttons?

Within a few years of the video game's launch in 2005, millions of its guitar-shaped controllers were manufactured. Sadly, many are collecting dust in closets across the globe. In my closet was one such controller, leaning awkwardly between some dirty hiking boots and a deflated soccer ball. In 2007, I pondered the depressing fate of this plastic bundle of star power. I sensed untapped potential, and I noticed how my acoustic guitar got plenty of my attention, unlike my sad old controller. What if the Guitar Hero controller could make music?

I knew it was possible and I saw a means to make it happen. After months of programming, I successfully re-purposed the controller as a musical instrument. No hardware modifications were made — it all happens with software running on my laptop. I formed a band with

---

friends, called the Guitar Zeros. We've got a singer and a drummer, and the other two of us use Guitar Hero controllers — one for guitar sounds and one for bass.

Here's how to make music with your own Guitar Hero controller using the software I designed.

Step 1 — Connect your controller.

Xbox 360™ Wireless Gaming Receiver

PlayStation®2 to USB Converter

- A Windows PC or Mac will work, but these first few steps outline the process using a PC laptop running Windows XP.

- Connect the Guitar Hero controller to your computer. A controller with a USB connector is easiest — no adapter necessary. Otherwise, see our website for a list of adapters available for $10 to $20.

- Your computer may automatically detect the new USB device and download the necessary driver from the internet. Alternatively, your adapter may have come with its own driver. To be sure the controller is properly connected to your computer, go to **Settings ⇒ Control Panel ⇒ Game Controllers**. You should see your game controller devices listed.

- Double-click the appropriate entry in the list, and you'll probably see a joystick calibration menu. You might not need to calibrate your Guitar Hero controller here, but you'll want to test all the inputs and watch the indicators light up as you press the buttons and flip the strum bar. If you're using a PlayStation 2 controller, the whammy bar may or may not be detected by your computer, depending on your adapter. Don't be discouraged — whammy bars are just for show-

offs anyway, right?

Step 2 — Download Fretbuzz software.
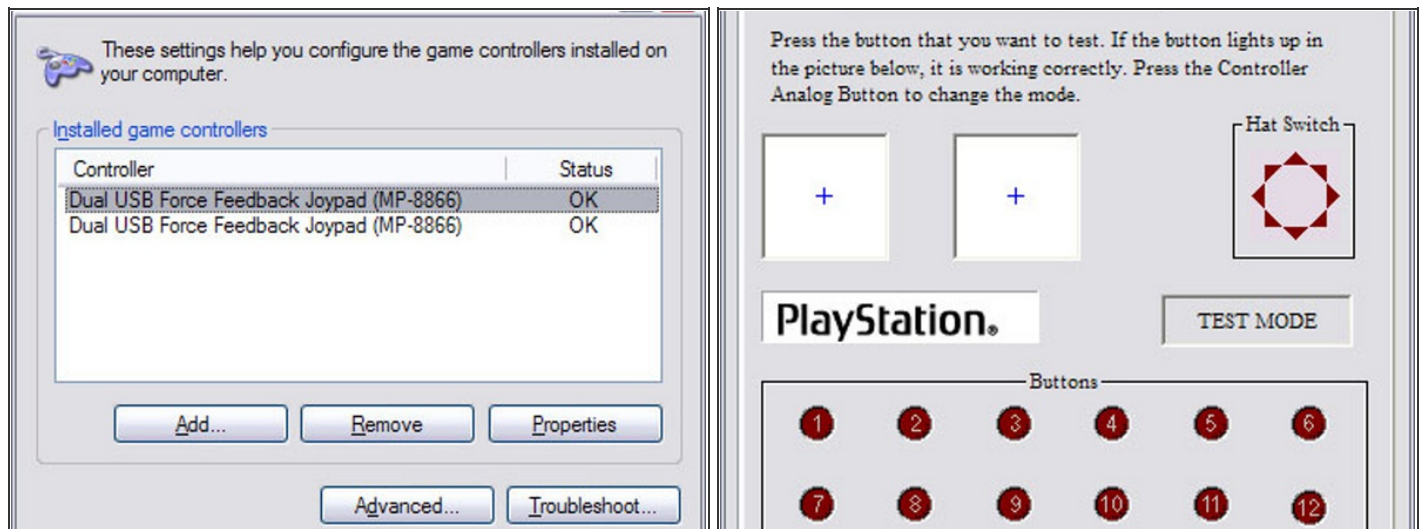
- [Download the software](#) that makes your controller and computer sing. All the components you need, and installation instructions, are free at our site. After downloading and installing Fretbuzz, you're ready to make some noise. Turn the audio on and rock out!

- There are a bunch of different sounds: some modeled after real guitars, some more bass-like, and some more synthesizery. There's even a mode that sounds like the Star Wars lightsaber. Look out, Darth Vader.

- Read the instructions within the software to change sound modes and learn how to use them.

Step 3 — Explore the musical possibilities.

- The Guitar Hero controller has 5 fret buttons, a strum bar that can be pressed up or down, start/ select buttons, and the Star Power tilt sensor inside the controller. I wanted to push the musical possibilities to the max. After months of trial and error, I developed and refined Fretbuzz. Here's a brief explanation of how it works.

- Do 5 buttons mean you can only make 5 notes? Hardly. There are 32 different combinations of those 5 buttons, which could theoretically be assigned to 32 different notes!

- However, holding down all 5 at once is almost impossible to do with 4 fingers, and some combinations would require you to stretch your hand to press both the first and last buttons. Tricky.

- Thus, I chose to use only the first 4 buttons for selecting notes, saving the last (orange) button for special purposes. This photo shows all the different combinations of the first 4 buttons and how I assigned them to chords within a key.

- Notice that chords are assigned in a binary progression? Pretty geeky, but it works! There are 16 different combinations, spanning 2 octaves. That's just enough of a range to work with, in my opinion.

Step 4
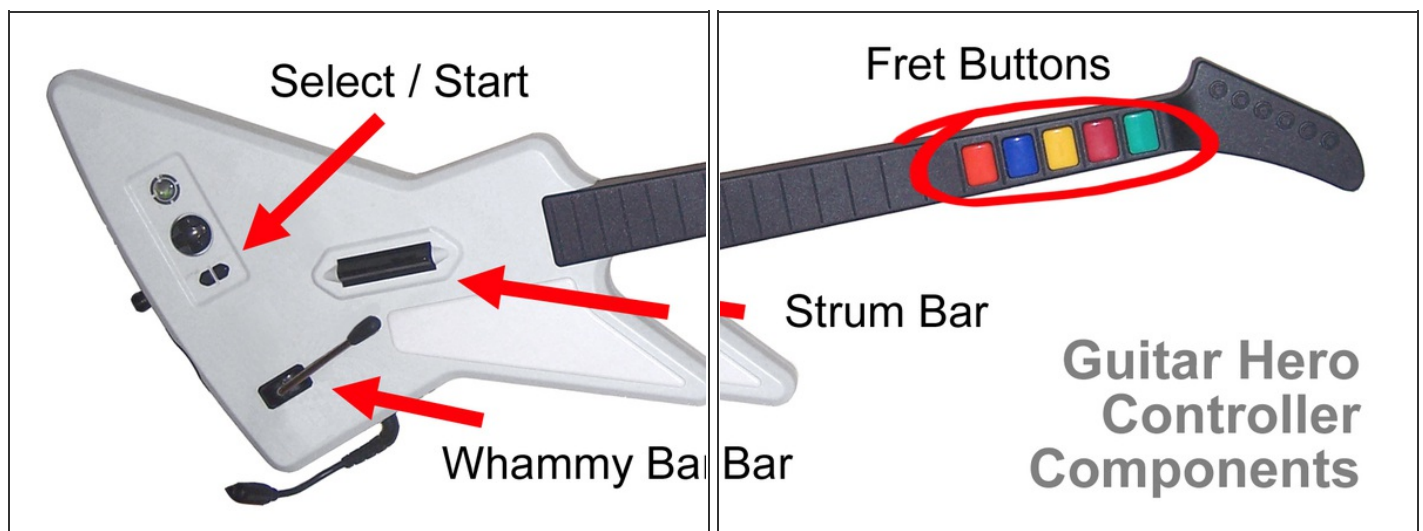
- The strum bar is naturally used to trigger notes. Lucky for us, the bar can be pressed either up or down, enabling 2 different potential results. With the power chord guitar sound, for example, I wanted a down-strum motion to produce a palm- muted effect, while the up-strum would let the chord ring out. And if you flip the strum bar up and down rapidly, then all the chords are palm-muted.

- On the other hand, with most of the bass sounds, the up-strum plays a note 4 steps higher, which makes it easy to play bass lines that alternate between a note and its relative fifth, common in some styles of music.

- Use the start and select buttons in conjunction with the fret buttons to choose different sound modes, adjust output volume, and perform key changes on the fly.

Step 5

- On a real electric guitar, the whammy bar reduces string tension, lowering the frequencies of the notes being played. So I thought to do the same with Fretbuzz. However, not all methods of sound synthesis allow for pitch changes on the fly, so the effect is available only for certain sounds.

- This is where the controller gets interesting! The tilt sensor in the newer controllers is a high-quality accelerometer that detects the orientation of the guitar in 2 dimensions.

- What in the world should this do, musically? There's no such tilt detector in a real guitar, so this is new terrain. I chose to apply 1 dimension of tilt to a band-pass filter, which produces a wah- pedal effect. It's good for performing solos — just ask Jimi Hendrix. What to do about the second dimension? I've tried a few different things, but I'm still exploring.

Step 6 — Try out the solo modes.

Use elbow on the strum bar while shredding fret buttons with both hands!

- In addition to the fret combination approach for chords, I designed 3 different solo modes that employ the fret buttons and strum bar in different ways. Imagine assigning each fret button to a relative change in pitch rather than an absolute pitch. In the basic solo mode, you can ascend a scale 1 note at a time by simply holding the blue fret button and flipping the strum bar. Or descend the scale by thirds by holding green.

- By alternating between ascending and descending within a key, while flipping that strum bar as fast as you can, you can produce some scorching lead lines.

- Any Eddie Van Halen fans out there? This guy is a two-hand-tapping master, and Fretbuzz definitely needs a two-hand-tapping mode. Much as in the basic solo mode, the fret buttons are assigned to pitches relative to one another, and the strum bar is used creatively to shift the notes of all the fret buttons at once in full-on arpeggio glory. But how do you use the strum bar when both of your hands are mashing fret buttons? With your elbow, of course.

- The concept of Star Power is unique to the Guitar Hero game, but I wanted to bring new meaning to it within Fretbuzz. I designed a

special chord/solo combo mode where you have to engage Star Power (tilt the controller straight up) to initiate the solo playing style, then tilt the controller back down again to return to chord mode.

Step 7 — Finally, make music.

- It's up to you to use Fretbuzz however you like, but I suggest you find a friend, plug 2 controllers into your computer at once (assign 1 to the bass sounds and 1 to the guitar sounds), jam out together, and write some tunes. Then of course, turn the volume up to 11 and blast your eardrums. Only kidding.

- Seriously though, it's difficult trying to re-create songs that were originally written on a real guitar. It's like learning a piece of music on guitar that was originally written for piano: sometimes shortcuts and adjustments are necessary. Fretbuzz might turn the Guitar Hero controller into an instrument, but it doesn't turn it into a guitar exactly.

- Designing Fretbuzz has been so exciting for me. It was no trivial task to turn the Guitar Hero controller into a playable, dynamic, and expressive instrument. Whatever your talents and interests may be, working within a constrained medium, as I did with this project, is a super way to get your creative juices flowing.

If you have questions about this project or need help getting Fretbuzz to work on your computer, or even if this project inspired you in some totally different way and you want to bounce ideas off someone, shoot me an email (owen@theguitarzeros.com). I'd love to hear from you. Happy shredding!

This project first appeared in [MAKE Volume 15](#) on pages 56-59.

This document was last generated on 2012-10-31 12:04:25 PM.